

WHAT IS CLAIMED IS:

1                   1.       An apparatus for supplying a chemical solution to a  
2 chemical injection part in a semiconductor manufacturing process,  
3 comprising:  
4                   a chemical solution supply source;  
5                   a feed line in which the chemical solution is supplied from the  
6 chemical solution supply source to the chemical solution injection part  
7 using a pressure of the chemical solution supply source; and  
8                   means for measuring/controlling a flow rate of the supplied  
9 chemical solution, the measuring/controlling means being mounted in  
10 the feed line,  
11                  wherein the feed line comprises:  
12                  a recycle line for preventing coagulation of the chemical  
13 solution, the recycle line being connected to the chemical solution  
14 supply source; and  
15                  a branch line branching from the recycle line, the branch line  
16 being connected to the chemical solution injection part, and  
17                  wherein the means for measuring/controlling the flow rate of  
18 the supplied chemical solution comprises:  
19                  a flow rate control valve;  
20                  a detector for detecting the flow rate of the chemical solution  
21 and generating a flow rate data signal, the detector being mounted in  
22 the feed line of the flow rate control valve; and  
23                  a controller for receiving the flow rate data signal and  
24 comparing the flow rate data signal with a reference flow rate data  
25 signal in order to output a control signal for controlling a degree of  
26 opening the flow rate control valve.

1                   2.        An apparatus as claimed in claim 1, wherein the  
2 controller comprises a proportional integral derivative (PID) automatic  
3 controller.

1                   3.        An apparatus as claimed in claim 1, wherein the  
2 controller further comprises a display device for displaying the  
3 measured flow rate and an alarm device for warning an operator that  
4 the measured flow rate is different from a required flow rate.

1                   4.        An apparatus as claimed in claim 1, wherein the  
2 chemical injection part is included in a polishing apparatus having a  
3 rotate-able turntable and a polishing pad.

1                   5.        An apparatus as claimed in claim 1, wherein the  
2 chemical solution is a slurry comprising one or more from the group  
3 consisting of a reaction reagent, friction particles, and a chemical  
4 reaction catalyst.

1                   6.        An apparatus for supplying a chemical solution to a  
2 chemical injection part in a semiconductor manufacturing process,  
3 comprising:  
4                   a plurality of chemical solution supply sources, each source  
5 supplying a different chemical solution;  
6                   a plurality of feed lines into which the chemical solutions are  
7 injected from the chemical solution supply sources to the chemical  
8 injection part by a pressure of the chemical solution supply sources;  
9 and

10           a means for measuring/controlling flow rates of the chemical  
11 solutions supplied to the chemical solution injection part, the means for  
12 measuring/controlling flow rates being mounted in each of the feed lines.

1           7.       An apparatus as claimed in claim 6, wherein the  
2 chemical solutions are mixed with each other just before being supplied  
3 to the chemical solution injection part.

1           8.       An apparatus as claimed in claim 6, wherein each  
2 one of the plurality of feed lines further comprises:  
3           a recycle line for preventing coagulation of the chemical  
4 solution, the recycle line being connected to an associated chemical  
5 solution supply source; and  
6           a branch line branching from the recycle line, the branch line  
7 being connected to an associated chemical solution injection part.

1           9.       An apparatus as claimed in claim 8, wherein the  
2 branch lines of each one of the plurality of feed lines are coupled by a  
3 coupling part to a single line just before supplying the chemical  
4 solutions to the chemical solution injection part, and  
5           wherein the coupling part is adjacent the chemical solution  
6 injection part.

1           10.      An apparatus as claimed in claim 9, further  
2 comprising a mixer for mixing the chemical solutions with each other,  
3 the mixer being installed at the coupling part.

1                   11.       An apparatus as claimed in claim 6, wherein each  
2 one of the plurality of chemical solutions comprises one or more from  
3 the group consisting of a polishing agent, a chemical additive mixed  
4 with the polishing agent, and de-ionized (DI) water.

1                   12.       An apparatus as claimed in claim 6, wherein each of  
2 the measuring/controlling means comprises:  
3                   a flow rate control valve;  
4                   a detector for detecting the flow rate of the associated  
5 chemical solution, the detector being mounted in the feed line of the  
6 flow rate control valve; and  
7                   a controller for receiving a flow rate data signal and  
8 comparing the flow rate data signal with reference flow rate data signal  
9 in order to output a control signal for controlling a degree of opening  
10 the flow rate control valve.

1                   13.       An apparatus as claimed in claim 12, wherein the  
2 controller comprises a proportional integral derivative (PID) automatic  
3 controller.

1                   14.       An apparatus as claimed in claim 12, wherein each  
2 one of the controllers further comprises a display device for displaying  
3 the measured flow rate and an alarm device for warning an operator  
4 that the measured flow rate is different from a required flow rate.

1                   15.       An apparatus as claimed in claim 6, wherein the  
2 chemical solution injection part is included in a polishing apparatus  
3 having a rotate-able turntable and a polishing pad.

1                   16.       A method of supplying chemical solutions using the  
2 apparatus claimed in claim 6, comprising the steps of:  
3                   respectively providing a pressure to a plurality of chemical  
4 solution supply sources;  
5                   respectively carrying chemical solutions from the chemical  
6 supply sources to a plurality of feed lines using the pressure; and  
7                   respectively measuring/controlling flow rates of the chemical  
8 solutions carried through the feed lines.

1                   17.       A method of supplying chemical solutions as claimed  
2 in claim 16, further comprising a step of mixing the measured/controlled  
3 chemical solutions just before supplying the chemical solutions to the  
4 chemical solution injection part.

1           18.       A method as claimed in claim 16, wherein the step of  
2       respectively measuring/controlling the flow rates comprises the steps  
3       of:

4                detecting flow rates of chemical solutions flowing into the feed  
5       lines and generating flow rate data signals indicating the detected flow  
6       rates of each respective chemical solution;

7                receiving flow rate data signals indicating the detected flow  
8       rates of each respective chemical solution and comparing the flow rate  
9       data signals with reference flow rate data signals in order to output  
10      control signals for controlling flow rate control valves of each respective  
11      chemical solution; and

12              controlling the flow rate control valves by means of the control  
13      signals to control the flow rate of the chemical solutions.

1           19.       A method as claimed in claim 18, further comprising a  
2       step of displaying the measured flow rates.

1           20.       A method as claimed in claim 18, further comprising a  
2       step of generating an alarm for warning an operator when any  
3       measured flow rate exceeds a permissible error range of a required flow  
4       rate.